

277ns Bunch Spacing for TeV upgrade?

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DESY

AD&I Webex Meeting 7.12.2011



Why shorter bunch spacing?

- Total RF pulse length:

$$T = N_{\text{bunch}} \Delta t + \text{const } G \Delta t / Q_{\text{bunch}}$$

Bunch Train

Cavity Filling

gets too large (1.97ms for 2625bunches)

for $G=31.5\text{MV/m} \rightarrow 45\text{MV/m}$ and

$$Q_{\text{bunch}} = 2.0\text{E}10 \rightarrow 1.74\text{E}10$$

- Which shorter bunch spacing is possible for the current DR circumference?
- Remember: Damping Ring allows only specific bunch spacings (fill pattern!)



A possible solution

- Only reasonable bunch spacing that I could find for current DR harmonic of $h=7022$:
 $k_b = 180$ [RF buckets at 650MHz]

	Nominal	Short
k_b	238	180
Δt	366ns	277ns
Pulse current at $1.74E10$	7.6mA	10.1mA
Total pulse length at 2625 bunches and $1.74E10$ (train + fill time)	1.97ms = 0.96+1.01	1.49ms = 0.73+0.76
Gap in DR	40ns	69ns
Bunches in DR train	47	68 (limit: 50)